

FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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While PARI believes that the intentions of the Commission are fully directed toward the growth of broadband services resulting in more choices to consumers, PARI must take exception to the beliefs that BPL is a viable opportunity to achieve these goals.

The political climate seems to be allowing logic, reason, and hard science to be over ridden by the wants and desires of those with a vested interest in seeing BPL approved. Contrived experiments do not serve America well. The thousands of engineers who have commented on BPL should not be taken lightly, but as a warning, which history will show, could have been heeded.

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In addition to commercial amateur shortwave receivers, a receiver kit was developed to allow students to build a receiver and learn about electronics via the RadioJOVE project. More than 300 receiver kits have been delivered in the past five years. This is one of NASA's most successful educational outreach programs. BPL stands a good chance of stopping this program for good by blocking signals from all but the strongest Solar Flares and Jupiter-Io storms.

2. Antenna Efficiency: Despite what is espoused by the BPL proponents, coupling of BPL signals to uncontrolled impedance high VSWR unshielded lines is in effect giving them an antenna. The effectiveness of this antenna is proportional to its length in wavelengths. Most typical power lines or house service entrance lines will provide multiple wavelength efficient radiators of this energy. In fact power lines will prove to be a lossy medium to convey the desired signal to its intended destination because of this radiation. That's why repeaters are required every few thousand feet.

In fact there are products already on the market which turn a home's wiring into an antenna for those amateurs and short wave listeners with severe restrictive covenants banning antennas. I see no reason why BPL should obey the laws of physics differently and not radiate.

3. These frequencies by nature are "International" in that very low power (milliwatts) can facilitate communications worldwide. In fact these frequencies are protected by ITU treaties of which the US is a signatory. Claims that the signals will not "propagate" fly in the face of all I know and have experienced.

I have personally done two way communications 2500 miles via 50 microwatts to a nine foot wide yagi antenna. BPL proposes to use 20-30 times this much power and yet claims it will only be audible a few hundred feet.

By radiating in this range the BPL providers will become the targets of worldwide interference complaints. But being a non-licensed service, it is not readily traceable, except to the nation of origin. Japan and other countries have withdrawn their interest in this technology after realizing its potential for interference both locally and globally.

It is imperative that the BPL systems identify in some format that is human readable. Consumers also need to be made blatantly aware that as Part15 devices these systems can both generate and receive interference and may have to be shut down accordingly. I know all units will have a label to that effect. But past experience shows that consumers have no idea what the label really means.

4. This technology while functional in limited tests, in our experience, will not “scale well”. That means the deleterious effects will grow exponentially with broad deployment. Large areas will in effect become more efficient phased array radiators of the BPL modulated signals. Those who claim the signals will not “aggregate” have not looked at the Citizens’ Band at 27 MHz on a spectrum analyzer, non-coherent signals do add. The BPL signals are far from “noise like”.

6. Interference: Due to the efficiency of the power lines as antennas at these frequencies, reciprocity says they will also couple or receive existing services’ RF power into the receivers of the BPL signals efficiently as well, in all likelihood slowing or rendering them inoperative. With millions of CB radios and 700,000 licensed amateurs the chances of this happening regularly are very likely. This will cause licensed users of this spectrum to become the targets of interference complaints from unlicensed and less technically competent users. NTIA studies show more than 15,000 services and millions of users licensed in the 1.7-80 MHz range.

7. It has been our personal experience that power utilities have a horrific record at correcting interference even from corona from damaged utility hardware at 60Hz. Only after direct intervention by the FCC have utilities attempted to rectify the situation, often taking more than a year to do so. It is logical to assume, that when this interference problem covers millions of existing services’ frequencies, the FCC’s challenges at enforcement will be unbelievable. Stiff enforcement penalties and timeframes are critical to this NPRM.

The power companies are ill equipped to monitor radio frequency interference. The 60 Hz corona problems require little more than an inexpensive AM radio to find, yet most utilities blindly install new power line hardware in whole subdivisions rather than systematically look for the real problem. Tracking down RF interference will require tens of thousands of dollars investment in test equipment and trained EMC/RFI personnel (which I have never encountered at a utility).

8. The likelihood of harmful interference to wide swaths of frequencies well above the intended 2-80 MHz is a certainty. My engineering experience has been that anywhere galvanic or dissimilar metals corrosion exists, a frequency doubling and tripling effect occurs in the signals. This is also called “passive intermodulation”.

The frequencies in jeopardy under these conditions includes sensitive Aviation frequencies in the 108-130 MHz range that use AM as their com mode. This mode is very noise sensitive. Cable system leakage is

already a hazard in this range, and this is from a shielded system. BPL is totally unshielded. An aircraft at 30,000 feet sees an area of at least 50 miles radius. The NTIA Phase I report indicates similar extended range fears for aviation, though focusing on the HF Com frequencies. Com and Nav frequencies can ill afford interruptions of service caused by leakage from BPL. A single downed aircraft linked to interference from a power system would likely generate hundreds of Millions of dollars in wrongful death lawsuits. (Indeed such a BPL affected crash has recently been implicated in Europe.)

9. Pisgah Astronomical Research Institute works in one of the most sensitive technology areas: radio astronomy. Signal levels from galactic and extra-galactic physical processes being studied here and at observatories around the world are routinely in the -200 dBm signal level. ITU BPL studies show signal levels for interference in the protected radio astronomy assignments could reach 100 dB above this, making millions of dollars of research equipment worthless overnight. ITU calculations show

Southern's contention (NPRM p.11, para25) that its system is "compliant with Part 15 requirements, and in fact tends to be in the noise floor" is another example of believing one's own political rhetoric. I suppose a badly setup spectrum analyzer could give one this impression, but reality would be 50-60 dB different once proper equipment procedures and noise calibrations are followed.

10. The Commission needs to insure that there are strong incentives in place to make rural areas economically viable if BPL is to be deployed. These areas will likely be the last to get BPL due to the extreme costs associated with rolling out service to an area with thinly spread users. Despite what the BPL and Power Industry is espousing, there is no penalty or prize associated with doing it any other way. The shareholders and Commission reviewing these systems deserve a better accounting of what may happen instead of believing the "forward looking" stock prospectus style statements.

I live in one of these remote last served areas. Promises of ISDN in '98 were followed by promises of ADSL in '99. The actual delivery date was over three years after DSL service rollout initially in the town a few miles away. I personally lost thousands of dollars due to this delay in delivering on their promises. But I still would not view BPL as the answer.

I don't think BPL can deliver on its promises. In the end, fiber will bring the needed aggregate bandwidth into the "last mile" even if BPL (or 802.11 wireless) is the delivery tool the customer might see.

Encouraging fiber all the way to the home is a much more upgradable future oriented approach.

BPL is the “black smoke belching high sulphur coal 1870’s steam locomotive approach, in a world of magnetic levitation trains.

While we encourage the Commission to take action to bolster broadband competition, PARI encourages the Commission to take the opportunity to employ sound engineering practices (as is currently done by the Commission with similar radiated and conducted susceptibility measurements) for the long term good of the American people. This should include maintaining Part 15 limits at current levels or below.

PARI agrees that the Commission should regulate in a neutral manner, however, this should not preclude proper engineering assessment, consideration to shielding, and emission limits. It is our recommendation as engineers, experienced radio frequency designers, radio astronomers, scientists, and users of equipment for this spectrum, that the BPL technology is wholly inappropriate for the scope and breadth of application being suggested in this case.

Two years from now these letters will undoubtedly be read back into the record as the warnings they were meant to be.

Respectfully submitted,

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